

## NEW CANADIAN RECORDS OF BAETIDAE (EPHEMEROPTERA) AND ADJUSTMENTS TO NORTH AMERICAN *CLOEON*<sup>1,2</sup>

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**ABSTRACT:** *Cloeon dipterum* and *Pseudocentroptiloides usa* are reported from Canada for the first time, and only the second record from Canada and the first from Ontario of *Pseudocloeon ephippiatum* is given. The occurrence of *C. dipterum* in North America is clarified and previous and new range data are provided.

The Canadian mayfly (Ephemeroptera) fauna was recently well documented by McCafferty and Randolph (1998), and more recently augmented by McCafferty (2000), Randolph and McCafferty (2001), Jacobus and McCafferty (2001, 2002), Burian (2001), Flannagan et al. (2001), Sun et al. (2002), and Webb et al. (2002). In spite of these efforts, the distinctive but rarely collected mayfly genera *Cloeon* Leach and *Pseudocentroptiloides* Jacob had not been reported from Canada. Herein we report the first Canadian records for two species of small minnow mayflies, including members of the latter mentioned genera: *Cloeon dipterum* (Linnaeus), Quebec, Aylmer (Gratineau) août Posées sur murs d'une maison, 1994 (no exact date provided), L. LeSage, adults; Etchemin R 31 km from jct with St. Lawrence R, 46/37/55N 71/01/04W, larva; Saskatchewan, Pike Lake at boat launch, IX-18-2001, J. M. Webb, larva, larval exuviae, female subimagos; *Pseudocentroptiloides usa* Waltz & McCafferty, Ontario, near Erin, 43/46/18N 80/05/37W, no date, larva. In addition, we have seen a second occurrence in Canada and first occurrence in Ontario for *Pseudocloeon ephippiatum* (Traver) as follows: Ontario, St. Clair R along Canadian side, Station A6, 42/48/05N 82/28/35W, VIII-10-2001, T. Moran & C. Johnston, larvae. Voucher specimens of all above records are housed in the Purdue Entomological Research Collection (PERC), West Lafayette, Indiana, USA. Additional vouchers of Canadian *C. dipterum* are housed at the Montreal Insectarium, Montreal, Quebec, Canada.

In North America, Burks (1953) and Traver (1962) reported the widespread Palearctic species *C. dipterum* from Illinois and Ohio, respectively. Subsequently, Flowers (1978) reported this same species from Pennsylvania but believed that the North American *Cloeon* actually was *C. cognatum* Stephens, a western Palearctic species that had been synonymized histori-

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cally under *C. dipterum*, but which had been re-erected by Sowa (1975). North American workers had not since questioned the Sowa (1975) or Flowers (1978) interpretation (e.g., McCafferty 1997).

After examining the first large series of adult *Cloeon* from North America, it became apparent to us that the very slight morphological differences that Sowa (1975) used to distinguish *C. cognatum* from *C. dipterum* either could not be ascertained or overlapped substantially in individuals. Many of the Quebec specimens, in addition to series we examined from Indiana (see Randolph and McCafferty 1998) and Virginia (Montgomery Co., pond, Rt 460, 4 mi B'burg, IV-16-1980, M. Gregg, adults [deposited at PERC and the Virginia Polytechnic Institute and State University, Blacksburg, Virginia]), tended to possess male genitalia most similar to those figured by Sowa (1975) for *C. dipterum* and a color pattern most similar to that which he attributed to *C. cognatum*. Workers have also encountered these same type of inconsistencies in Europe. This became apparent in a review of the recent faunistic literature dealing with European mayflies. The vast majority of European authorities either have not recognized any validity for *C. cognatum* or have chosen to ignore its existence by only documenting *C. dipterum*. For example, Maitland (1980), Macan (1983), and Elliott et al. (1988) in their work on British mayflies retained only the name *C. dipterum* for any varieties possibly attributable to that species. Bauernfeind and Humpesch (2001) listed only *C. dipterum* in their treatment of Central European mayflies. Studemann et al. (1992), in their study of Swiss mayflies, treated *C. cognatum* as a synonym of *C. dipterum*, and Mol (1985) for the Netherlands, and Haybach and Malzacher (2002) for Germany regarded *C. cognatum* as of dubious status.

Based on the observed unreliability of putative species characteristics used for *C. cognatum* and variation in the North American specimens, along with the recognition of the main consensus among European workers, we are not considering *C. cognatum* valid and are applying the name *C. dipterum* to all known North American *Cloeon*. Certainly European workers are in the best position to judge this synonymy because *C. dipterum* is such a common lentic species there.

In addition to the records in Illinois, Indiana, Ohio, Pennsylvania, Quebec, Saskatchewan, and Virginia noted above, this species is also known from Maine (Burian and Gibbs 1991), Connecticut (Burian and Bednarik 1994), and Kentucky (Knott Co., Carr Fork, VI-27-1978, W. P. McCafferty and A. V. Provonsha, larvae [PERC]). Of considerable note is also the fact that nearly all North American mayfly species that are Holarctic in distribution (see e.g., McCafferty and Randolph 1998) occur in Scandinavia. This is also true for *C. dipterum* (see Engblom 1996). A more southerly, narrow distribution in Europe, however, is shown by the *C. cognatum* variant when it has been recognized (e.g., Sowa 1975, Thomas and Masselot 1996).

McCafferty (1996), Randolph and McCafferty (1998), and McCafferty and Mauremootoo (2000) had indicated that *C. cognatum* was a singular example of an adventive species of mayfly in North America. *Cloeon dipterum*, however, in light of its Holarctic and better understood North American distribution pattern clearly is not adventive in North America.

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